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What's the weather up there? [Ketchikan, Alaska. 1938.] [8] p. illus. 30 cm. (From the Alaska sportsman, October 1938.)

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Transatlantic aviation and meteorology. [Toronto. 1938.] p. 217-231. illus., diagrs., maps. 26½ cm. (Reprinted from The journal of the Royal astronomical society of Canada, May-June, 1938. v. 32, no. 5.)

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Weather and the human body. [Chicago. 1938.] [4] p. illus. 29½ cm. (From Hygeia, August, 1938.)

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Fifty inches of rain. A story of land and water conservation. [Washington. 1939.] 111 p. illus. (incl. map), tables, diagrs. 23½ cm.

**SOLAR OBSERVATIONS**

[Meteorological Research Division, EDGAR W. WOOLARD in charge]

**SOLAR RADIATION OBSERVATIONS, JULY 1939**

By CHARLES M. LENNAHAN

Measurements of solar radiant energy received at the surface of the earth are made at eight stations maintained by the Weather Bureau, and at 10 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrhelio-metric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory of Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the MONTHLY WEATHER REVIEW, December 1937, pages 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of

direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parenthesis). At Madison and Lincoln the observations are made with the Marvin pyrhelimeter; at Washington and Blue Hill they are obtained with a recording thermophile, checked by observations with a Marvin pyrhelimeter at Washington and with a Smithsonian silver disk pyrhelimeter at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

During July, normal incidence intensities averaged below normal at Madison and Blue Hill and slightly above normal at Lincoln and Washington.

Total solar and sky radiation averaged above the May normals at all stations with the exception of Miami and Riverside.

Beginning with this issue data will be included in table 2 for Cambridge, Mass. These data are furnished through the cooperation of Massachusetts Institute of Technology; Prof. H. C. Hottel of the Department of Chemical Engineering has offered to supply these data regularly. The average daily total of solar radiation for the first week of record (June 25-July 1, 1939) was 426 gram-calories per square centimeter.

The data for Ithaca are not given in this issue because word was received from Prof. A. J. Heinicke of Cornell University that due to mechanical defects their values have been incorrect for the past several months. These data will be corrected and published later in this section of the MONTHLY WEATHER REVIEW.

TABLE 1.—*Solar radiation intensities during July 1939*

[Gram-calories per minute per square centimeter of normal surface]

## WASHINGTON, D. C.

Date	Sun's zenith distance										Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
		e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0		5.0
July 1	<i>mm.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>mm.</i>	
July 1	14. 10			1. 04	1. 18	1. 37					11. 38	
July 11	10. 21	0. 74	0. 84	. 97	1. 15	1. 35					9. 47	
July 12	11. 38	. 51	. 61	. 77	. 99	1. 35					11. 81	
July 15	9. 14			1. 02	1. 28						8. 45	
July 17	11. 38		. 55	. 68	. 89						10. 21	
July 31	15. 65		. 49	. 65	. 91						14. 60	
Means		. 62	. 62	. 86	1. 07	(1. 36)						
Departures		+. 03	-. 06	+. 05	+. 15	+. 14						

## MADISON, WIS.

July 1	10.97	0.62	0.76	0.91	1.11	1.35					9.14
July 8	17.06	.65	.75	.94		1.35					16.20
July 10	10.97	.65	.75	.80	1.08	1.37					9.47
July 11	11.81	.61	.70	.81	1.01	1.28					11.81
July 12	11.81	.45	.58	.75	.92						15.11
July 13	19.23	.48	.58	.70	1.06	1.37					8.48
July 14	10.59	.68	.77	.95	1.16	1.40					10.21
July 20	10.97				.86						12.24
July 24	14.10	.61	.74	.88	1.07	1.31					9.83
July 26	16.79	.60	.69	.83							15.65
July 27	18.59	.65	.74	.87	1.08	1.25					17.37
July 29	10.21	.84	.92	1.04	1.18						13.61
July 31	12.68	.69	.79	.90	1.11	1.28	0.99				13.13
Means		.63	.73	.86	1.06	1.33	(.99)				
Departures		-.05	-.05	-.05	-.01	+.03	+.01				

TABLE 1.—*Solar radiation intensities during July 1939—Continued*

[Gram-calories per minute per square centimeter of normal surface]

## LINCOLN, NEBR.

Date	Sun's zenith distance											Local mean solar time	
	8 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon		
	75th mer. time	Air mass											
		A. M.						P. M.					
		e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0		
	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.		
July 5	16.79			0.72	0.92						19.23		
July 6	22.00				1.06	1.37	0.98	0.78			21.28		
July 7	17.37						1.13				18.59		
July 8	16.79		0.94	1.10	1.27						11.81		
July 10	13.13		.89	1.01			1.11	.88	0.69		10.97		
July 14	12.68							.82	.66		13.61		
July 17	17.96						1.04	.87	.72		17.37		
July 20	16.79		.64	.77	.99	1.31		.81	.66		16.79		
July 24	13.13						1.04	.85	.68		11.38		
July 26	12.34		.87	1.02	1.20	1.38	1.24	1.06	.93		14.10		
July 29	13.13		.90	1.03	1.21	1.45					10.59		
Means			.85	.94	1.11	1.38	1.09	.87	.72				
Departures			+.06	+.02	+.02	+.04	+.02	-.02	-.04				

## BLUE HILL, MASS.

July 2	11.1				1.07						8.6
July 3	8.8				1.12	1.40					7.6
July 4	11.9						1.05	0.89	0.73	0.57	8.8
July 6	11.1	0.41	0.51	0.67							14.3
July 11	8.8			1.01	1.11						9.9
July 13	7.6				1.20						8.2
July 15	10.7							.82	.67		8.2
July 16	8.8										8.8
July 17	10.3			.80	1.08						10.7
July 18	9.9			.82	1.10	1.35					8.8
July 19	9.6				1.40						9.9
July 20	9.9		.86			1.31	1.10				9.6
July 21	10.7		.87			1.03	.87	.74	.65		10.7
July 24	14.3	.63	.70	.78							16.9
Means		(.52)	.74	.82	1.11	1.36	1.06	.86	.71	(.61)	
Departures		-.06	+.08	-.07	+.05	+.09	+.04	-.06	-.09	-.10	

\*Extrapolated.

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

Week beginning—	Gram-calories per square centimeter															
	Washington	Madison	Lincoln	Chicago	New York	Fresno	Cambridge	Fairbanks	La Jolla	Miami	New Orleans	Riverside	Blue Hill	San Juan	Friday Harbor	Newport
July 2	cal. 565	577	632	540	556		689	594	566	356	427	569	676	680	493	677
July 9	693	684	703	688	524		607	377	574	411	391	552	678	664	571	594
July 16	404	467	507	511	540	737	617	496	586	477	430	546	670	623	646	670
July 23	477	568	649	472	399	661	418	412	630	536	352	514	492	713	714	435
Departures of daily totals from normals																
July 2	+49	+41	+33	+63	+84			+132	-5	-122	+17	-35	+60	+60	-70	+127
July 9	+193	+141	+104	+217	+72			-95	-11	-95	-9	-33	+155	+50	-3	+82
July 16	-72	-58	-74	+46	+112	+34		+60	+27	-34	+21	-14	+151	-1	+4	+168
July 23	-7	+52	+87	+1	-20	-2		-37	+137	+22	-28	-27	+26	+93	+95	-44
Accumulated departures since Jan. 1																
	+9,814	+6,692	+4,305	+10,507	+4,842	+322		-49	+4,347	-700	+3,710	-1,820	+2,926	+6,284	+3,927	+1,827